PROCJENA UČINKA RAZLIČITIH PROGRAMA TRENINGA FIZIČKE PRIPREME I POBOLJŠANJA SPORTSKIH PERFORMANSI POWERLIFTERA SA VISOKO KVALIFIKACIJSKIM OŠTEĆENJEM VIDA

ASSESSING THE EFFECTS OF DIFFERENT TRAINING PROGRAMS FOR PHYSICAL PREPARATION AND SPORTS PERFORMANCE IN POWERLIFTERS WITH VISUAL IMPAIRMENTS OF HIGH QUALIFICATION

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SAŽETAK

Sistematsko preopterećenje, koje je karakteristika treninga powerliftera sa oštećenjima vida visoke kvalifikacije, negativno utiče na funkcionisanje tijela i tok osnovnog stanja vida i na pojavu komorbiditeta. Time se utvrđuje relevantnost naučnog utemeljenja programa treninga za sportiste sa oštećenjem vida kao najvažnije komponente osiguravanja postizanja sportskih rezultata u powerliftingu.

Ovo istraživanje imalo je za cilj eksperimentalno potkrijepiti učinkovitost uticaja različitih programa treninga na tjelesnu spremnost i atletske performanse powerliftera sa oštećenjem vida visoke kvalifikacije. Da bi se cilj ostvario, korištene su metode analize naučne i metodičke literature, pedagoško posmatranje, pedagoški eksperiment i metode matematičke statistike. U istraživanju je učestvovalo 16 slabovidnih sportista koji su bili članovi nacionalnog powerlifting tima. Eksperiment se temeljio na testiranju učinkovitosti dva programa treninga koji su se razlikovali u parametrima komponenti opterećenja u godišnjem trenažnom i makrociklusnom razdoblju. Eksperimentalna grupa je nakon eksperimenta pokazala pouzdane pokazatelje povećanja na svim testovima i poboljšanja sportskih rezultata, a sportisti kontrolne grupe povećali su fizičku spremnost u tri od pet testova (sportski rezultati dostupni su samo u čučnju i bench pressu). U obje grupe najveće stope rasta nivoa razvijenosti tjelesnih osobina utvrđene su u testovima za utvrđivanje stepena razvoja snage i fleksibilnosti. Upoređujući rezultate uvođenja različitih programa treninga u trenažni proces powerliftera sa oštećenjem vida, može se zaključiti da je učinak eksperimentalne grupe znatno veći nego kod powerliftera kontrolne grupe.

Ključne riječi: *makrociklus, invalidnost, adaptivni sportovi, volumen, intenzitet*

INTRODUCTION

A significant increase in public interest in the sports results of athletes with disabilities leads to the acquisition of adaptive sports Olympic characteristics (Dehghansai, Lemez, Wattie & Baker, 2017; McNamee, 2017; Wareham, Burkett, Innes & Lovell, 2017; Rudenko, Hlozhyk, Guzii & Prystupa, 2017). The principle of maximum approximation to Olympic sports extends to the ideological principles of adaptive sports and scientific and methodological support for the training of athletes, which leaves its mark on the practical side of the training of athletes in various sports (Kozina, Lytovchenko, Safronov, Boichuk, Chaika, Shepelenko, Polianskyi, Protsevskiy, Peretyaha, & Konnova, 2019).

The same competitive exercises and identical rules of competitions in power sports among athletes with disabilities and among healthy people allowed coaches to use the experience of Olympic sports in adaptive sports (Vanlandewijck & Thompson, 2016; Ferland & Comtois, 2019). Therefore, the scientific justification for the training of athletes with disabilities in power sports for a long time was based on the scientific work of scientists in the study of the system of training healthy athletes (Castro, Cardoso, Filho, Gaya & Araújo, 2016; Bengtsson, Berglund & Aasa, 2018). The active development of power sports in the structure of adaptive sports in recent decades and significant progress in athletic performance of athletes in powerlifting among athletes of different nosological groups has led to a number of studies to train athletes with disabilities.

Most of the works on scientific and methodological support for the training of athletes with disabilities in power sports relate to the nosological group of musculoskeletal injuries (Roztorhui, Perederiy, Briskin & Tovstonoh, 2018). In the context of the fact that only athletes with musculoskeletal injuries participate in the Paralympic Games in power sports, conducting a significant amount of research is justified by the great social significance of sports results. Power sports in the structure of adaptive sports also include powerlifting, armwrestling and bodybuilding among athletes of other nosological groups. Despite the fact that the representation of power sports among visually impaired athletes is not in the program of the Paralympic Games, powerlifting among athletes of this nosological group is actively developing both in Ukraine and in the world.

Scientific knowledge on the training of athletes with visual impairments in powerlifting is formed on the basis of studying the impact of power sports on the body for athletes with visual impairments (Barone, Ascione & Tafuri, 2018), psychological aspects of training athletes with visual impairments (Winnick, 2016), technical and physical fitness for athletes in this nosological group (Winnick, 2016; Roztorhui, Perederiy, Briskin, Tovstonoh, Khimenes & Melnyk, 2018) and effectiveness of competitive activities for athletes (Swinton, Lloyd, Keogh, Agouris & Stewart, 2012; Santos, Vigario, Mainenti, Ferreira & Lemos, 2017). Scientists do not pay attention to the problem of rational construction of training of visually impaired

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athletes in powerlifting, which is the basis for the realization of sports potential and the formation of adaptation to intensive training in competitive activities. Today in the practice of adaptive sports to build training programs for powerlifters with visual impairments of high qualification uses an approach characterized by the maximum possible parameters of the volume and intensity of the load and causes forcing sports results and depletes the body's reserve capacity (Colquhoun, Gai, Walters, Brannon, Kilpatrick, D'Agostino & Campbell, 2017; Androulakis-Korakakis, Langdown, Lewis, Fisher, Gentil, Paoli & Steele, 2018; Pichardo, Oliver, Harrison, Maulder, Lloyd & Kandoi, 2019). In addition, shortcomings in the construction of training programs and the lack of consideration of nosological features in the training process do not allow to fully realize the sporting potential, and excessive stress can cause irreversible negative changes in the body of highly qualified athletes (Sherrill, 2003; Weiler, Van Mechelen, Fuller & Verhagen, 2016; Willick, Cushman, Blauwet, Emery, Webborn, Derman, Van de Vliet, 2016; Roztorhui, Perederiy, Briskin & Tovstonoh, 2018).

The aim of the research was to experimentally substantiate the effectiveness of the impact of various training programs on physical fitness and sports performance of powerlifters with visual impairments of high qualification.

METHODS

Participants. The study involved members of the national team in powerlifting among visually impaired athletes, including 4 athletes of sports class B1, 6 athletes of sports class B2 and 6 athletes of sports class B3 (Mann & Ravensbergen, 2018). Information on the medical diagnosis was taken from the medical and classification cards of the athletes. The average age of athletes was 34.50 ± 4.31 years. Athletes were divided into control and experimental groups of 8 people each. All athletes were informed about the conditions of the experiment and agreed to the processing of personal data. The research has followed the tenets of the Declaration of Helsinki and has been approved by the authors' institutional review board.

Procedures. Participants of the study were engaged in groups of higher sportsmanship on the basis of regional centers of physical culture and sports "Invasport" with the norm of a weekly regime of educational and training work of 36 hours. The total duration of the experiment was 12 months. Training programs for visually impaired athletes of the control and experimental groups provided for a total of 1877 hours of training work. The number of training activities per year for highly qualified athletes was 469, in a weekly microcycle – 9, and the duration of training activities was 4 hours.

The structure, means and methods of training programs for athletes of the control and experimental groups were the same. Table 1 shows the percentage distribution between the different sections of the training programs for athletes of the control and experimental groups.

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Table 1. *The structure of training programs for powerlifters with visual impairments of high qualification*

Program material section	Number of hours	% of the total
Callisthenics(Physical preparation\training)	670	35,69
Technical training	383	20,41
Theoretical training	192	10,23
Mental training	304	16,20
Tactical training	29	1,55
Restorative measures	245	13,05
Control	30	1,59
Competitive activity	24	1,28

The content of training programs for athletes of the control and experimental groups differed in the parameters of the load components in the annual training and macrocycle periods: the total number of barbell lifts in the annual training of powerlifters with visual impairments, the number of barbell lifts in the intensity zone 90-100% of the maximum at different periods of the macrocycle and the ratio of general physical training, auxiliary physical training and special physical training described in Table 2.

Table 2. *Load indicators in the annual training of powerlifters with visual impairments of highly qualified experimental and control groups*

Load components	Indicators in CG	Indicators in EG
Total volume in annual training*, thousands of times	15.8	12.8
The repetitions in the intensity zone 90-100% of the maximum result,%	5.4	4.5
Training intensity of squat in the competitive / preparatory / transitional period of the macrocycle,%	74.3/70.0/60,9	77.0/65.6/54.2
Training intensity of bench press in the competitive / preparatory / transitional period of the macrocycle,%	76.2/69.0/61.0	79.0/65.2/53.1
Training intensity of deadlift in the competitive / preparatory / transitional period of the macrocycle,%	73.4/68.5/60.3	75.2/64.0/50.2
Correlation GPT, APT and SPT, %	10:10:80	10:10:80

Legend: CG – control group; EG – experimental group; GPT – general physical training; APT – auxiliary physical training; SPT – special physical training; total volume in annual training = sets × repetitions.

The control group trained of a standard program that provided high indicators of the volume and intensity of the load both in the annual training and in some structural elements of the macrocycle. A training program for experimental group contained much lower indicators of the total volume, the repetitions in the intensity zone 90-100% of the maximum result and the training intensity in competitive exercises in the preparatory and transitional periods of the macrocycle.

*Testings***.** In order to determine the level of physical fitness for athletes with visual impairments before and after the experiment, indicators of physical development were determined using pedagogical tests described in Table 3. For this purpose, nosological features for athletes and the specifics of their motor activity in the training process were taken into account. Determination of the level of physical fitness before and after the experiment was performed in the same time period with the obligatory warm-up before testing.

Table 3. *Pedagogical tests to determine the physical fitness of powerlifters with visual impairments of high qualification*

Test	Physical quality
Push-ups, the number of repetitions	Muscular endurance
Seated medicine ball throw, m	Power
Sit and reach flexibility test, cm	Flexibility
One-leg balancing test (right leg), s	Coordination qualities
One-leg balancing test (left leg), s	Coordination qualities

The level of muscular endurance development in visually impaired athletes was determined by the results of push-ups. To perform the exercise, the athletes took the starting position: lying down, arms shoulder-width apart, legs raised, torso parallel to the floor, on the coach's command, the athlete bent his arms at the elbows to an angle of 90°, while maintaining the torso parallel to the floor. After fixing the stationary position at the lowest point, the athlete returned to the starting position.

The seated medicine ball throw from behind the head was performed from a seating position, holding the ball with both hands in front of it. Medicine ball weighing 1 kg was used for throwing. A centimetre mark was applied to the floor. On the coach's command, the athlete swung backwards for his head and threw forward.

To determine the level of flexibility in visually impaired athletes used sit and reach flexibility test, conducted from the initial sitting position, the athlete's feet were in a vertical position to the floor, five – at the level of zero marking, the distance between the feet – 20-30 cm, hands placed in front of him palms down. At the coach's command, the athlete leaned forward, reaching for the markings with his fingers, and fixed this position for 2 seconds.

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Keeping the balance on one leg meant that on the coach's command, the athlete with his eyes closed raised one bent leg at the knee to a 90° angle and raised his arms to a sideways position. After the athlete fixed the stationary position, the coach used a stopwatch to record the time in seconds during which the athlete held this position.

Statistical analysis. The obtained results were analysed using Statistica (Statsoft version 6.00). Because the number of athletes did not allow for an analysis of the normality of the distribution, Wilcoxon signed-rank test was used to determine the significance of differences in performance on the level of physical fitness of athletes before and after the experiment. The Mann-Whitney U test was applied to determine the significance of differences in performance by the level of physical fitness for athletes before and after the experiment between the control and experimental groups. Significance of differences was defined as an indicator at a significance level of $p<0.05$.

RESULTS

Analysis of the results of pedagogical testing before the experiment revealed the absence of significant differences ($p>0.05$) between the indicators of physical fitness for athletes in the control and experimental groups, which indicates their homogeneity. It was found that after the experiment between the indicators of physical fitness for athletes in the control and experimental groups there were significant differences ($p<0.05$), which indicates a different direction and effectiveness of the proposed training programs. The analysis of the dynamics of indicators for athletes with visual impairments of high qualification of the control group revealed reliable indicators of growth of physical fitness ($p<0.05$) in three of the five tests described in Table 4. The highest indicators of improvement of physical fitness among athletes with visual impairments high qualification of the control group was found in the tests that determine the manifestation of power and flexibility. Thus, in the test "Push-ups" the increase was 8.33%, "Seated medicine ball throw" – 15.13% and "Sit and reach flexibility test" – 15.77%. The lowest rates of increase in physical fitness among the control group were found in the test "One-leg balancing test", which characterizes the level of development of coordination qualities. According to the results of tests "One-leg balancing test" before and after the experiment among athletes of the control group no significant differences were found ($p>0.05$).

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Table 4. *Indicators of physical fitness of powerlifters with visual impairments of high qualification before and after pedagogical experiment*

Tests	Results in CG ($n = 8$)		p	Results in EG ($n = 8$)		p
	Before experiment $\bar{x} \pm SD$	After experiment $\bar{x} \pm SD$		Before experiment $\bar{x} \pm SD$	After experiment $\bar{x} \pm SD$	
Push-ups, the number of repetitions	20.40±3.28	22.10±4.11	<0.05	21.10±4.04	25±2.26	<0.05
Seated medicine ball throw, m	4.23±0.63	4.47±0.36	<0.05	4.27±0.74	5.43±1.13	<0.05
Sit and reach flexibility test, cm	2.03±2.11	2.21±3.07	<0.05	2.07±4,04	2.73±0.53	<0.05
One-leg balancing test (right leg), s	13.31±1.11	13.45±1.01	>0.05	13.26±1.07	14.33±1.10	<0.05
One-leg balancing test (left leg), s	12.43±0,78	12.55±0.53	>0.05	12.48±0.96	13.74±0,91	<0.05

Legend: CG – control group; EG – experimental group; p – the difference in the group before and after experiment.

Analysis of the results of the implementation of training programs in the training process shows the presence of reliable indicators ($p<0.05$) of the increase in physical fitness among athletes with visual impairments of the experimental group for all tests. As a result of the experiment, the best growth rates were found in tests aimed at determining the level of development of power and flexibility. A comparative analysis of the increase in the parameters of physical fitness for athletes of the control and experimental groups shows that the indicators of the experimental group are much higher than among the powerlifters of the control group. Growth rates among athletes of the experimental group in the test "Push-ups" the increase was 27.17%, "Seated medicine ball throw" – 18.48% and "Sit and reach flexibility test" – 31.88%,"One-leg balancing test" – 8.01% for the right leg and 10.05% for the left leg.

Based on the analysis of the effectiveness of competitive activities of powerlifters with visual impairments, which was conducted based on the performances for athletes at the championships of Ukraine and the world championships 2018–2019, the effectiveness of the developed programs described in Table 5. In the analysis of the effectiveness of competitive activities, we

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used the Wilks coefficient, which in accordance with the rules of competition is used to compare the sports results of powerlifters of different weight categories. Thus, the sports result in points was defined as the product of the Wilks coefficient and the result in competitive exercises and the amount of total, which was demonstrated by athletes in competitive activities before and after the pedagogical experiment.

Table 5. *Indicators of sports results of powerlifters with visual impairments of high qualification before and after the pedagogical experiment*

Competitive exercises	Results in CG ($n = 8$)		p	Results in EG ($n = 8$)		p
	Before experiment $\bar{x} \pm SD$	After experiment $\bar{x} \pm SD$		Before experiment $\bar{x} \pm SD$	After experiment $\bar{x} \pm SD$	
Squat, points	115.38±24.30	121.81±25.07	<0.05	116.21±22.08	129.76±24.11	<0.01
Bench press, points	78.35±19.42	81.58±14.18	<0.05	77.24±11.18	85.15±15.01	<0.05
Deadlift, points	146.65±25.20	148.34±22.12	>0.05	145.23±23.70	158.54±22.39	<0.05
Total, points	340.38±63.25	351.73±62.23	>0.05	339.68±64.87	371.45±60.47	<0.05

Legend: CG – control group; EG – experimental group; p – the difference in the group before and after experiment.

It was found that the performance for athletes with visual impairments of high qualification of the control group before and after the experiment differ statistically at a confidence level of $p < 0.05$ in squats and bench press. In deadlift and total no significant differences in the performance for athletes in the control group were found ($p > 0.05$). Among the representatives of the experimental group there are significant differences before and after the experiment in all competitive exercises and total ($p < 0.05$). The analysis of indicators of dynamics of efficiency of competitive activity of sportsmen of control and experimental groups allows making a conclusion about higher parameters of simple sports result both in competitive exercises and total at representatives of experimental group. This is especially noticeable when analyzing the growth rates in deadlift and total. As a result of the pedagogical experiment among the athletes of the control group, the increase in sports results in deadlift was 1.15% and in total – 3.33%, and among the experimental group, these figures were 9.16% and 9.32%. The increase in sports results in squat and bench press among the athletes of the control group was 5.57% and 4.12%, and among the representatives of the experimental group, the increase in these competitive exercises was 11.66% and 10.24%.

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DISCUSSION

As a result of the pedagogical experiment, we obtained data confirming the provisions of the general theory of training athletes in terms of determining the intensity and volume of load in the process of building the training of highly qualified athletes (Colquhoun, Gai, Walters, Brannon, Kilpatrick, D'Agostino & Campbell, 2017; Androulakis-Korakakis, Langdown, Lewis, Fisher, Gentil, Paoli & Steele, 2018; Solberg, Hopkins, Paulsen & Haugen, 2019). The results obtained in our study indicate a significant impact of the parameters of the load components in some structural elements of the annual training of powerlifters with visual impairments of high qualification on the level of their physical fitness and competitiveness. Given such a significant impact of load components on the training of highly qualified powerlifters, irrational construction of training using excessive parameters of the volume and intensity of the load can have an adverse effect on the body for athletes with disabilities (Sherrill, 2003; Weiler, Van Mechelen, Fuller & Verhagen, 2016; Willick, Cushman, Blauwet, Emery, Webborn, Derman & P Van de Vliet, 2016; Barone, Ascione & Tafuri, 2018).

According to most authors, with the increase of preparedness, all indicators of the load components increase, and in the training of highly qualified athletes, the parameters of volume and intensity reach a maximum (Colquhoun, Gai, Walters, Brannon, Kilpatrick, D'Agostino & Campbell, 2017; Bengtsson, Berglund & Aasa, 2018). In accordance with these recommendations, we introduced into the training process a training program for athletes of the control group, which provided high indicators of the volume and intensity of the load both in the annual training and in some structural elements of the macrocycle. Thus, the total volume in the training program for athletes of the control group amounted to 15.8 thousand times, which is the limit of the amount of annual training for athletes in powerlifting.

Instead, the training program of the experimental group contained much lower indicators of the total volume, the repetitions in the intensity zone 90-100% of the maximum result and the training intensity in competitive exercises in the preparatory and transitional periods of the macrocycle. But the indicators of training intensity in some exercises in the competitive period in the training program of powerlifters with visual impairments of the experimental group were higher than in the training program of the control. This approach to building a training program for highly qualified athletes has been substantiated by a number of experts in the field of weightlifting, but experimental confirmation of the effectiveness of this approach in powerlifting has not been conducted (Solberg, Hopkins, Paulsen & Haugen, 2019).

According to the results of the pedagogical experiment it was found that both training programs are effective for improving the preparedness and effectiveness of competitive activities of powerlifters with visual impairments, due to the growth of leading physical qualities for powerlifting and sports results in some exercises. That is why we can talk about the effectiveness of both training programs. However, the impact on the level of development of physical qualities for athletes with visual impairments is not the same, as evidenced by the presence of significant differences ($p<0.05$) between the indicators of

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physical fitness for athletes in the control and experimental groups after the experiment. The positive effect of the implementation of the author's training program on the indicators of physical fitness and sports performance of powerlifters with visual impairments of high qualification is much higher. As a result of the pedagogical experiment, the representatives of the experimental group of growth on all tests and in all competitive exercises and total are higher and they differ before and after the experiment at a confidence level of $p<0.05$. After the experiment in athletes of the control group, significant growth rates ($p>0.05$) were not detected in tests to determine the level of development of coordination qualities, deadlift and total.

An important result of the study is to confirm the possibility of improving the construction of powerlifters with high visual impairments not by increasing the parameters of the total volume and total intensity in annual training, but by increasing the training intensity only in the competitive period against the background of reducing all other load parameters. On the one hand, the use of such an approach to the training of highly qualified athletes allows to ensure a sufficient level of adaptive shifts in the body of powerlifters to demonstrate high sports results, and on the other – to reduce the negative consequences of intensifying the load on reserve capacity and health. This is especially important in the training for athletes with disabilities, which is due to the social unjustifiability of the adverse effects of high-achievement sports on their bodies and the need to maintain athletic longevity.

The results obtained in our study partially contradict the current provisions of training athletes in powerlifting, as declared in the studies of Colquhoun, R. J., Gai, C. M., Walters, J., Brannon, A. R., Kilpatrick, M. W., D'Agostino, D. P., & Campbell, B. I. (2017). However, these provisions were formulated on the basis of experimental data among healthy powerlifters, which suggests the need to substantiate approaches to the construction of training powerlifters with high qualifications with disabilities other than those used in sports high performance among healthy athletes.

CONCLUSIONS

The analysis of the obtained results revealed that after the experiment the indicators of physical fitness of the control group significantly differed ($p<0.05$) from the indicators of the athletes of the experimental group. The highest rates of increase in physical fitness and increase in sports results were found in athletes of the experimental group. This indicates a more specialized impact on the effective components of the training of powerlifters with visual impairments of the highly qualified program, which trained athletes of the experimental group. As a result of the introduction of various training programs in the training process of athletes with visual impairments of highly qualified confirmed much greater effectiveness of the training program, which is based on lower indicators of total volume and intensity in annual training and relative intensity in competitive period of the macrocycle.

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ОЦЕНКА ВЛИЯНИЯ РАЗЛИЧНЫХ ПРОГРАММ ТРЕНИРОВОК НА ФИЗИЧЕСКУЮ ПОДГОТОВЛЕННОСТЬ И СПОРТИВНЫЕ РЕЗУЛЬТАТЫ ПАУЭРЛИФТЕРОВ ВЫСОКОЙ КВАЛИФИКАЦИИ С НАРУШЕНИЕМ ЗРЕНИЯ

РЕЗЮМЕ

Систематические перегрузки, характерные для тренировок пауэрлифтеров высокой квалификации с нарушением зрения, негативно сказываются на функционировании систем организма, течении основных и сопутствующих заболеваний спортсменов. Это определяет актуальность научного обоснования программ тренировок спортсменов с нарушением зрения как важнейшего компонента обеспечения достижения спортивных результатов в пауэрлифтинге. Целью данного исследования было экспериментальное обоснование эффективности влияния различных программ тренировок на физическую подготовленность и результативность соревновательной деятельности пауэрлифтеров высокой квалификации с нарушением зрения. Для решения поставленной задачи использовались методы анализа научно-методической литературы, педагогического наблюдения, педагогического эксперимента и методы математической статистики. После педагогического эксперимента экспериментальная группа показала достоверные показатели роста по всем тестам и улучшение спортивных результатов во всех упражнениях, а у спортсменов контрольной группы повысилась физическая подготовленность в трех тестах из пяти, а спортивные результаты повысились только в приседаниях и жиме лежа. В обеих группах наиболее высокими темпами роста уровня развития физических качеств были выявлены тесты, направленные на определение уровня развития силы и гибкости. Сравнивая результаты внедрения различных программ тренировок в тренировочный процесс пауэрлифтеров с нарушением зрения, можно сделать вывод, что показатели экспериментальной группы намного выше, чем у пауэрлифтеров контрольной группы.

Ключевые слова: *макроцикл, инвалидность, адаптивные виды спорта, объем, интенсивность.*

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PROCJENA UČINKA RAZLIČITIH PROGRAMA TRENINGA FIZIČKE PRIPREME I POBOLJŠANJA SPORTSKIH PERFORMANSI POWERLIFTERA SA VISOKO KVALIFIKACIJSKIM OŠTEĆENJEM VIDA

ABSTRACT

Systematic overload, which is a training characteristic of powerlifters with visual impairments of high qualification has a negative impact on the functioning of body systems and the course of the underlying and comorbidities. This determines the relevance of the scientific substantiation of training programs for athletes with visual impairments as the most important component of ensuring the achievement of sports results in powerlifting. This study aimed to experimentally substantiate the effectiveness of the impact of various training programs on physical fitness and athletic performance of powerlifters with visual impairments of high qualification. To solve the goal we used methods of analysis of scientific and methodological literature, pedagogical observation, pedagogical experiment and methods of mathematical statistics. The study involved 16 visually impaired athletes who were members of the national powerlifting team. The pedagogical experiment was based on testing the effectiveness of two training programs, which differed in the parameters of the load components in the annual training and macrocycle periods. After the pedagogical experiment, the experimental group showed reliable indicators of growth on all tests and improvement of sports results, and athletes of the control group increased physical fitness in three tests out of five and sports results are available only in squat and bench press. In both groups, the highest growth rates in the level of development of physical qualities were found in tests aimed at determining the level of development of strength and flexibility. Comparing the results of the introduction of various training programs in the training process of powerlifters with visual impairments, we can conclude that the performance of the experimental group is much higher than among the powerlifters of the control group.

Key words: *macrocycle, disability, adaptive sports, volume, intensity.*

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